



# How To: Solve A Rubik's Cube

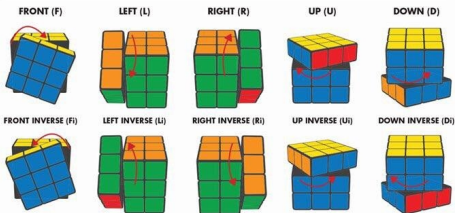
## THINGS TO KNOW BEFORE YOU START

- The square in the middle of one side indicates that sides' colour. eg. green square = green side.
- Always hold the cube so the 'Front' face is towards you when completing moves.
- The 'i' indicates the move is inverted or counter-clockwise in direction.
- Each turn is 1/4 turn rotation/90°.

## LAYERS



## MOVES



## STEP 1: CROSS



- A.** Locate the centre orange square and place that side as the top layer.



- B.** Locate centre orange pieces and rotate so they are in the bottom layer, lining up with it's corresponding colour. Turn F 180°.



- C.** Repeat for other 3 centre pieces until cross is achieved.

### \*COMPLICATION\*



If the piece is switched around, do: F U U Ui.

## STEP 2: CORNERS



- A.** Locate orange corner piece in bottom layer and rotate to it's corresponding corner colours.

- B.** Do sequence: Ri Di R D.

Repeat until orange is in the top layer, correctly placed.



- C.** Repeat for other 3 corners.



## STEP 3: MIDDLE



- A.** Flip the cube - orange layer now on bottom. Find and rotate centre cubes in top layer to match colours with middle layer.

- B.** Use left or right sequence depending on which direction the colour in the top layer needs to go.

Left: Ui U L U L F Ui Fi  
Right: U R Ri U Ri Ui Fi U F

Repeat until middle layer is completed.



### \*COMPLICATION\*



Colour is switched after completing all sides.

Do left or right sequence and this will bring it to the top layer. Repeat step b.

## STEP 4: TOP CROSS



- A.** Locate L-shape in top layer. Rotate so it's in the topleft corner.

Do: F R U Ri Ui Fi.  
Repeat for horizontal line, and again for cross.



- B.** Rotate top layer until 2 adjacent centre cubes line up with centre cubes of middle layer.

- C.** Place one side at the back and the other on the righthand-side. Do sequence: R U Ri U R U Ri Ui.

All centre cubes will line up with the middle layer.

### \*COMPLICATIONS\*

Only **i.** singular cube or **ii.** horizontal line, in step **A.**

- i.** Do step (a) sequence for L-shape.  
**ii.** Do **A** sequence for cross.

Opposite sides match up in step **B** - do sequence in **C** and continue from **B**.

## STEP 5: TOP CORNERS



- A.** Rotate top layer so one corner is corresponding with it's corner colours and place in bottom-right.

- B.** Do sequence: U R Ui L U Ri L.

Repeat sequence if required, keeping the correct corner in the bottom-right, till all corners have corresponding correct colours. Some or all the colours will be scrambled.

- C.** Starting with the bottom right colour, do: Ri Di R D.

Repeat until corner is completed. Rotate ONLY the top layer Ui, and repeat sequence for other corners.



- D.** Rotate top and bottom layers to match middle layer colours.

### COMPLETE!





# RUBIK'S®

CUBE



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# RUBIK'S®

CUBE



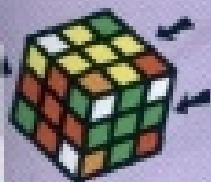
**NEW**

## 7 STEP SOLUTION GUIDE

For 1 Player AGES 8 to Adult

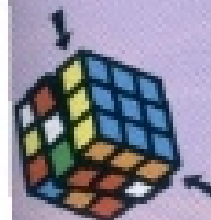


## Rubik's Cube Games



**Crossing** is the real key to starting to solve the whole cube. In crossing, you must get the four middle squares on each side of one face the same colour as the central square on that face. As with "Siding", you can start without getting the over-the-edge squares of each arm of the cross right. However in proper crossing over-the-edge colour of each arm of the cross must match the colour of the central square on each over-the-edge side.

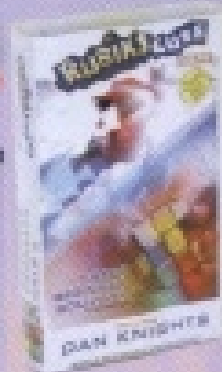
Try to get two crosses on adjacent sides – then three and you're on your way to solving the whole cube!



To explain "Over-the-edge" colours.

Let's assume you are making one side of the cube all blue. Each of the blue pieces (except the central one) has another colour "over the edge" on the adjacent side as shown by the arrows. Pieces in the middle of an edge have only one "over-the-edge" colour and corner pieces have two.

You can buy other RUBIK products including products including many exclusive items, on exclusive items, on line at [www.rubikshop.com](http://www.rubikshop.com) Dan Knights' first first video in the series to learn how to solve how to solve the cube in under a minute is a must for any RUBIK's enthusiast. There is also the VIRTUAL CUBE VIRTUAL CUBE SOLVER, that will give a give a step-by-step solution movie, personalised to your own scrambled cube! Check out the latest RUBIK's puzzles at: [www.rubikshop.com](http://www.rubikshop.com)



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## Rubik's Cube Games

### HAVING FUN – WITHOUT SOLVING THE WHOLE CUBE

You don't HAVE TO solve the whole cube to have fun with it. From simply trying to make one side of the same colour to making diagonals or crosses on several sides, you can choose the task that fits the time you have to spend.

The cube can be a brilliant way to relax, if you know that the challenge you have set yourself is do-able. Instead of reading the hints booklet from start to finish, why not try to find your own ways of making the following patterns. Who knows, you might invent a whole new way of doing it?

The following patterns to try are in order of difficulty, so it makes sense to try them in the same order.



**Cornering** is as easy or hard as you want, depending on how many sides you decide to "corner". Start with one side, making a diagonal row of three of the same colour.

## Rubik's Cube Games

In the next level choose one end of your row of three and make another diagonal on an adjacent side from one of the over-the-edge colours of the corner you have chosen. You can keep going until all the sides have been cornered – but if you're that good, you can probably solve the whole cube anyway.



**Siding** has two levels. In the first you try to make a whole side of one colour in any way you can. You don't have to make three-in-a-row of the other colours over-the-edge along each side. If you're trying to develop cube solving skills, you should try to make a cross on the side you're solving, then fill in the corners. Of course you CAN do it any way you want – and maybe it's more fun trying to develop your own style?

In the second level of siding, the rows of three over-the-edge from each side must be three-in-a-row of one colour.

## Rubik's Cube Games



**Crossing** is the real key to starting to solve the whole cube. In crossing, you must get the four middle squares on each side of one face the same colour as the central square on that face. As with "Siding", you can start without getting the over-the-edge colours of each arm of the cross right. However in proper crossing the over-the-edge colour of each arm of the cross must match the colour of the central square on each over-the-edge side.

Now try to get two crosses on adjacent sides – then three and you're well on your way to solving the whole cube!



To explain "Over-the-edge" colours.

Let's assume you are making one side of the cube all blue. Each of the blue pieces (except the central one) has another colour "over the edge" on the adjacent side as shown by the arrows. Pieces in the middle of an edge have only one "over-the-edge" colour and corner pieces have two.



## How each step works -

**B** - Turn the Back Face a quarter turn clockwise



**Ri** - Turn the Right Face a quarter turn counter-clockwise



Example  
Turns

Each step can be used to solve up to **FOUR** pieces if there are none solved when you start the step. Please note that these illustrations display a sample of a situation on your cube for **ONE** of the possible **FOUR** pieces needing to be solved. In many cases, you will need to rotate the cube to a new starting face (with red, orange, yellow or white center square) and repeat the instructions in order to place /rotate all the pieces in that step before moving on. The end result will only come **AFTER** all four sides of the cube have been through that step's sequence and all the pieces are in their proper location and oriented properly to match the surrounding center square colors. As such, you may have to repeat the same step a few times with different sides as the starting face until all the pieces are solved.

## Step 1 - Solve the Upper Green Cross

**HINT:** To solve the green cross, you have to solve each green edge piece on your own, one-by-one. The tricky part is not messing up the ones you've already solved. First solve the red-green edge, then the white-green edge, then the orange-green edge, then the blue-green edge. You have to figure this part out for yourself. Should you ever have an edge piece in the correct place but flipped the wrong way, use this step to flip it without affecting the other three green edges. Just hold the cube with the piece in the upper-right position as in the picture below, and do the sequence **Ri U Fi Ui**. The edge piece will now be solved, and you can work on the next edge piece.

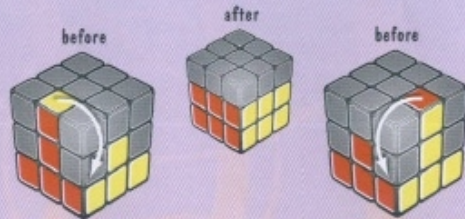


**Ri U Fi Ui**



### Step 3 - Solve the Middle Layer Edges

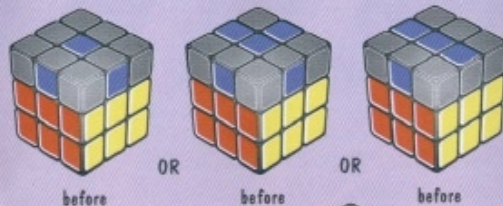
HINT: Now flip the cube over so green is on the bottom. Try to find the red-yellow edge piece. If it's in the top layer, turn it until the edge matches one of the pictures below. Then do the corresponding sequence to solve it. If the red-yellow edge piece is somewhere in the middle layer, but it's in the wrong place or flipped the wrong way, hold the cube so that the red-yellow edge is in the front-right position, and do either sequence once. (This may require you to rotate the cube to a new face). After the move, the piece is in the top layer, and you can solve it as described above. Repeat this for the other 3 middle-layer edges.



U R U<sup>i</sup> R<sup>i</sup> U<sup>i</sup> F<sup>i</sup> U F U<sup>i</sup> F<sup>i</sup> U F U R U<sup>i</sup> R<sup>i</sup>

### Step 4 - Solve the Middle Layer Edges

HINT: Turn the top layer until the edges match one of these pictures. If you do the sequence below once and you still don't have a blue cross, then repeat this step until you do. It doesn't matter which face you start with.



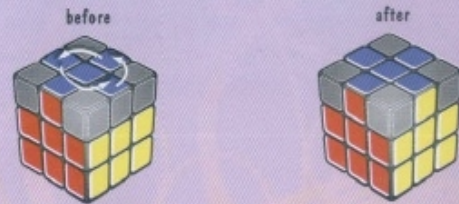
F R U R<sup>i</sup> U<sup>i</sup> F<sup>i</sup>



after

### Step 5 - Solve the Top Edges

HINT: Hold the cube with red in front. Turn the top layer until the red and blue edge piece is solved as in the picture, and then repeat the sequence below until the yellow and blue edge piece is also solved, on the right side. Now turn the whole cube so that white is the "Front" face. If the top white edge isn't solved, just do the sequence once more, followed by "U" to position all the edges properly.



R U R<sup>i</sup> U R U R<sup>i</sup>



## Step 6 - Solve the Top Corners

**HINT:** Find a corner piece that's in the right place, and hold the cube with that piece above your right thumb. In the picture, this piece is the blue, yellow, and red piece. Don't turn the top layer at all, because you will mess up the edges that you just solved in step 5. Now do the sequence below once or twice to put the other 3 corners into the right places. If you can't find a corner piece in the right place, just do the sequence below once before you start this step.



U R Ui Li U Ri Ui L

## Step 7 - Solve the Top Corners

**HINT:** Hold the cube with red in front. Keep turning the top layer until the upper-front-right corner needs to be flipped, to have blue on top, like in the picture. Do the sequence below either 2 or 4 times to flip the corner so that blue is on top. With red still in front, keep turning the top layer and do the sequence again whenever needed to flip the upper-front-right corner piece. When all the corners have been flipped, just turn the layer to solve the cube. Congratulations, you've done it!



( Ri Di R D ) x 2 or 4

## Rubik's Cube Games

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In the second level of siding, the rows of three over-the-edge from each side must be three-in-a-row of one colour.

# 7 Step Solution Guide

Each step involves a sequence of twists of the cube to move a particular square. Just repeat the required steps and the cube is solved!

Each face of the cube is known by a letter. Each step is made up of a sequence of twists of the cube. A twist is to turn a face of the cube by a quarter turn. The sequence of letters for each step means to turn that face of the cube by a quarter turn clockwise, then the next face and so on, for the complete sequence. The letter 'i' means to turn a face counter-clockwise. Complete the sequence for that step and you will have moved the required square. Before you start each move, be sure to place your thumbs on the F side of the cube like the picture. This will insure your cube is properly orientated to execute the move.

## Turn clockwise

**R** - Right Face

**L** - Left Face

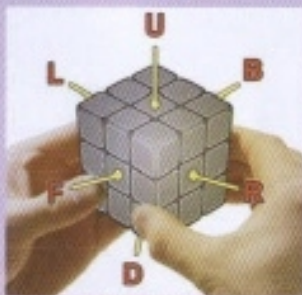
**B** - Back Face

**D** - Down Face

**F** - Front Face

**U** - Upper Face

**?i** - Inverse (turn CCW)



## Hint:

To turn a face clockwise imagine you are facing that side of the cube



# GET TO KNOW YOUR RUBIK'S CUBE

## STAGE 1:

### DEFINITIONS OF RUBIK'S CUBE PIECES

#### THE PARTS:

#### EDGE PIECES

PIECES WITH TWO (2) COLORS. THERE ARE TWELVE (12) EDGE PIECES LOCATED IN THE MIDDLE ROWS.



#### CORNER PIECES

PIECES WITH THREE (3) COLORS. THERE ARE EIGHT (8) CORNER PIECES LOCATED ON THE CORNERS.



#### CENTER PIECES

PIECES WITH ONE (1) COLOR. THERE ARE SIX (6) CENTER PIECES LOCATED IN THE CENTER OF EACH SIDE. CENTER PIECES **DO NOT MOVE** AND REPRESENT THE COLOR OF THEIR SIDE.

**WHITE** **YELLOW** **ORANGE** **RED** **GREEN** **BLUE**



CENTER PIECE COLORS ARE ALWAYS OPPOSITE EACH OTHER:

- **WHITE** OPPOSITE **YELLOW**
- **ORANGE** OPPOSITE **RED**
- **GREEN** OPPOSITE **BLUE**

# EACH SIDE OF THE CUBE IS REPRESENTED BY A LETTER

**R** = Right Face - Right side of the cube



**L** = Left Face - Left side of the cube



**U** = Up Face - Top side of the cube



**D** = Down Face - Bottom side of the cube



**F** = Front Face - Front side of the cube



**B** = Back Face - Back side of the cube



A letter with an "**i**" after it means an inverted or counter-clockwise move when looking at the face directly.

## VERY IMPORTANT

When making the moves below hold your cube full-face front with logo on top as shown. Dark grey on the pictures means the color does not matter. Each move is a  $1/4$  turn rotation.



## STAGE 2:

# SOLVE THE WHITE CROSS

### Holding Your Cube:

Holding your cube with the **white center piece** on the top (**U**) face, you must create a white cross as shown to the right. Much of this level is achieved with practice and by trial and error...but we do have some tips.



### Tips:

- Be sure to solve the sections of the white cross in the following order - blue, orange, green, red.
- Notice the **EDGE PIECE COLORS** above match the top white center piece and the side red and blue center pieces. This is how we know the edge pieces are in the correct positions.
- Keeping the **white center piece on top**, move the blue/white edge piece to the bottom (**D**) face, then rotate it on the bottom until it is directly under the blue center piece. Now hold your cube so the blue center piece and blue/white edge piece are on the right (**R**) face.



Rotate the right (**R**) face until the blue/white edge piece is on the top (**U**) face and above the blue center piece.



- If your cube looks like this, hold your cube so the orange center piece is on the right (**R**) face and start solving the side with the orange center piece the same way as stated above.



- If your cube looks like this, do the sequence below making sure the blue center piece is on the right (**R**) face.



### Congratulations!

If your Cube has a white cross that looks like this picture, you can move to **Stage 3!**



# SOLVE THE WHITE CORNERS

## STAGE 3:

### Holding Your Cube:

With the white cross on top (**U**) face, you must solve the white corner pieces.

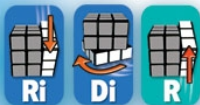
#### Tips:

- Corner pieces will have one white side plus 2 other colors.
- If the corner piece is already on the bottom (**D**) face, then rotate the bottom (**D**) face until the corner is directly below its intended location. Once in that position, your cube may look like any one of the 3 pictures on the right.

**THEN** do the sequence below **1X**, **2X** or **3X** or **UNTIL** it is in the correct position



- Repeat this process for all four corners.
- If the corner piece is on the top (**U**) face, move it to the bottom (**D**) face by doing:



**NOW** rotate the bottom (**D**) face **UNTIL** the corner is directly below its intended top (**U**) face location.

### Congratulations!

If your white layer looks like the picture here, you have completed one third of the cube and you can move to **Stage 4!**



Your Goal



## STAGE 4:

# SOLVE THE MIDDLE LAYER

### Holding Your Cube:

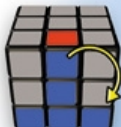
With the **COMPLETED WHITE LAYER** on the **BOTTOM**, now you have to solve the middle layer, which means positioning the 'edge pieces' in the correct place.



### Tips:

- Notice the vertical row of blue (this could be red, orange, green)  
- **THIS IS CRITICAL!**
- Create a vertical line by rotating the top (u) face until the front color of the edge piece on the top (u) face without yellow on it matches a side center piece. The color on the edge piece's top (u) face will determine the direction the edge piece should move.

- 1) If you're moving the edge piece in the same direction as indicated in the picture, then follow the sequential moves pictured below:



- 2) If you're moving the edge piece in the opposite direction as indicated in the picture, then follow the sequential moves pictured below:



Continue these steps until all the edge pieces are in the correct position.

**NOTE:** If one of the edge pieces is already in the middle row, but in the wrong position, then do either one of the sequential moves, and it will move to the top layer. Then you can do the appropriate sequential moves to position it in the correct location of the middle layer.

### Congratulations!

If your bottom two layers look like this picture, you can move to **Stage 5**. You Are Two Thirds of the Way Done!





# SOLVE THE TOP LAYER... GET THE YELLOW CROSS

## STAGE 5:

### Holding Your Cube:

- 1) Match the yellow pattern on the top (u) face of your cube to one of the yellow patterns shown on the cubes below.
- 2) Then follow the correct sequence.



Your Goal

### Tip:

- Yellow edge pieces on the top (u) face do **NOT** need to match on the side pieces... yet!

### 1<sup>st</sup> Step : Make a yellow cross



Proceed to the 2<sup>nd</sup> Step on the next page.



Then match the result to State 3 or 4, hold the cube to match that State and do that sequence.



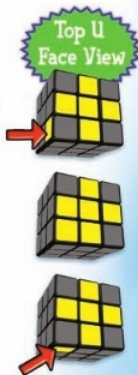


# SOLVE THE TOP LAYER... GET ALL THE YELLOW ON TOP

## 2<sup>nd</sup> Step: Make all the corners yellow

**NOW**, look at the top (u) face and match your top (u) face to one of the states below

- State 1. If **No Corner** Cubes are Yellow on the top (u) face, you must have Yellow **Left** Corner on Left Face as shown
- State 2. If **One Corner** Cube is Yellow match your top (u) face as shown and do the sequence below.
- State 3. If Any **Two Corner** Cubes are Yellow don't worry about their position. You **MUST** match the front (F) face with a Yellow Left Corner as shown.



Do this sequence **1, 2** or **3 times** to achieve a complete yellow top (u) face. After each sequence, orient the cube to **REMATCH** the top (u) face to the appropriate state and repeat the sequence until all corners are yellow.



**Congratulations!**

If your cube looks like this picture you can move to **Stage 6!**



# POSITION THE YELLOW CORNERS CORRECTLY

## STAGE 6:

### Holding Your Cube:

- 1) While holding cube as shown, **NOW** twist the top (U) face until at least **2** corners are in the right location. **2** corners **MUST** be in the right location as **A, B** or **A, D** or **B, C** as shown below. If all 4 corners are in the right place then proceed to **2nd step** on next page.



Your Goal

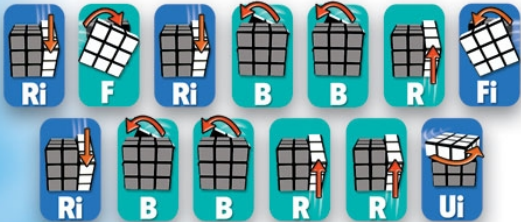
### 1<sup>st</sup> Step: Position yellow corners correctly

While holding your cube as shown above, look at the top (U) face. Place the **2** correct corners in the back **A, B** or diagonally **A, D** or **B, C** across from each other.

Top U  
Face



If Corners **A** and **B** are in the right place then to switch **C** and **D**, do the sequence below:



If you need to **switch diagonal corners** like **B** and **C** or **D** and **A**, then do the sequence once. Then, orient the cube so the **2** correct corners are in the back and do the sequence again.

**Congratulations!**

If your cube looks like this picture you can move to the **2nd Step!**



# POSITION YELLOW EDGES CORRECTLY

## 2<sup>nd</sup> Step: Position yellow edges correctly

Top U Face



If **1** edge is correct and **3** edges are incorrect orient the cube so the face with the correct edge is the back (**B**) face. Then, determine if the edge pieces need to move **clockwise** or **counter-clockwise** and do the correct sequence below.



Your Goal

Top U Face



If all **4** edges are incorrect, then do either sequence below once, and then determine what direction the three edge pieces need to move and do the correct sequence below.

To cycle **E F G** Clockwise or **E F G H** Clockwise



To cycle **E F G** Counter-Clockwise or **E F G H** Counter-Clockwise



**Congratulations!**



## Try these additional moves

# Now you CAN do the RUBIK'S<sup>®</sup> CUBE

### Multicolored Cross

Holding the solved cube full front do the following sequence:



### Multicolored Cross



### Square In The Middle

Holding the solved cube full front do the following sequence:



### Square In The Middle



## Fun Facts!

If you made a single turn of one of the Cube's faces every second, it would take you 1400 trillion years to go through all the possible configurations. (By way of comparison, the universe itself is only 14,000 billion years old.)

The most expensive Rubik's Cube was the Masterpiece Cube, produced by Diamond Cutters International in 1995. This actual size, fully-functional cube features 225 carats of amethyst, 34 carats of rubies, and 34 carats of emeralds, all set in 18-carat gold, and was valued at approximately 1.5 million US dollars.

Movie star Will Smith solved the Rubik's Cube in the 2006 motion picture, *Pursuit of Happyness*, but before that he could be seen solving the cube in a 1993 episode of his television sitcom *Fresh Prince of Bel Air*, when his character is interviewed by the Director of Admissions of Princeton University.

The largest Rubik's Cube was built by Daniel Urlings of Luxemburg. It could contain 64 normal sized Rubik's Cubes.

More than 300 million Rubik's Cubes have been sold worldwide.